

REMARKS/ARGUMENTS

Favorable reconsideration of the present application is respectfully requested.

Claims 1-19 have been canceled. Claims 20-27, 41-43 and 49-94 have been withdrawn from consideration. New Claim 95 has been introduced. Basis for this claim may be found in Fig. 38.

Claims 28-40, 44-48 and 95 are active in the application. Moreover, since Claim 28 is believed to be patentable and remains generic to the species corresponding to its dependent Claims 41-43, it is respectfully requested that these claims be included in any patent issuing from the present application.

In response to the rejection under 35 U.S.C. §112, the phrase "moving object" has been changed to "vehicle" throughout the claims. This rejection is therefore believed to be moot.

Claims 28-34, 36, 37 and 44 were rejected under 35 U.S.C. §103 as being obvious over U.S. patent 5,808,448 (Naito) in view of Japanese patent publication 50-31516. However, Applicant respectfully submits that the claims define over any combination of these references.

Vehicles, including but not limited to hybrid vehicles, having both an electric motor and a heat engine as power sources are known. Additionally, it is known to provide such vehicles with both a fuel cell and a secondary battery as electric power supplies of the motor (page 4, lines 18-19). However, the control of the power sources and power supplies in such a known vehicle have been insufficient.

According to a feature of the invention set forth in the claims, a control unit controls the operations of power sources including a motor and a heat engine, and also controls operations of electric power supplies including a fuel cell and a secondary battery, according to a driving state of the vehicle. For example, referring to the non-limiting embodiments

disclosed in the specification, and particularly Figure 38 (beginning at page 148), if it is determined at step S1020 that the vehicle is in a motor driven (MG) area of operation based upon the driving state of the vehicle (e.g., vehicle speed and accelerator travel in Figure 8), the control unit selects either the battery as an electric power supply for the electric motor (step S1050) or the fuel cell as an electric power supply for the electric motor (step S1060) based upon the state of charge of the battery (step S1030) and the remaining fuel for the fuel cell (step S1040), respectively. If both the state of charge of the battery and the fuel cell fuel quantity are insufficient, moreover, the engine is set as the working power source (step S1080) despite the decision in step S1020 that the vehicle is in the motor driven operating area MG. Thus, the control unit controls operations of both the electric power supplies and the power sources according to a driving state of the vehicle.

Naito discloses an electric vehicle using an electric motor 14 as a power source, wherein the electric power supply of the electric motor may be either an energy battery (fuel cell) 1 or a power battery 2 which are connected in parallel. The motor 14 may be supplied with electricity by either the fuel cell 1 or the power battery 2, depending on load requirements (col. 2, lines 50-55). Additionally, the fuel cell 1 may be used to charge the power battery 2 (col. 2, lines 59-61). However, as the Examiner has recognized, Naito lacks a heat engine, and so can provide no teaching of a control unit that controls operations of electric power supplies and power sources – including a heat engine – according to a driving state of the vehicle.

The Examiner has therefore relied upon Japanese patent publication 50-31516 (JP ‘516) to suggest modifying Naito to include a heat engine as an additional power source. JP ‘516 discloses a hybrid vehicle provided with an engine 1 and an electric motor 2, wherein the electric motor 2 receives electric power from a fuel cell. However, there is no description therein of a secondary battery as an electric power source for the motor. Indeed, the

specification of JP '516 describes that the fuel cell is provided as the electric power supply for the motor because high powered batteries are problematic to recharge. Accordingly, as a threshold matter, JP '516 would not have motivated those skilled in the art to have added a heat engine to the vehicle in Naito, which includes a secondary battery 2, since JP '516 teaches against the combination of a fuel cell and a secondary battery in a vehicle having a motor and a heat engine.

Beyond this, those skilled in the art would not have been taught by any combination of the above references that a control unit should control operations of both the fuel cell and secondary battery, and the motor and heat engine, according to a driving state of the vehicle. Naito does not include a heat engine and so could provide no teaching for a control unit that controls both operations of electric power supplies, and power sources including a heat engine. JP '516 discloses a heat engine in combination with a fuel cell supplied electric motor, but provides no teaching as to the control of operation of the heat engine, the electric motor, the fuel cell and a (non-existent) battery. Since neither reference discloses control of a system including a fuel cell and a secondary battery, as well as a motor and heat engine as power sources, no combination of the above references would teach or suggest a control unit that controls operations of a fuel cell and a secondary battery, as well as a motor and heat engine as power sources, according to a driving state of a vehicle.

Dependent Claim 29 is directed to the feature noted above whereby the working electric power supply is selected based upon the observed remaining charge of the battery. In contrast, the power battery 2 of Naito is continuously connected to the motor 14. A low battery charge detected by the battery detector 5 is used for the selective recharge of the power battery 2, not for its selection as a working electric power supply.

Additionally, Claim 29 recites the selection of a motor as a working power source. No such selection is present or necessary in Naito which has only the motor as a power source.


New Claim 95 recites the feature of the invention exemplified by Figure 38 wherein the engine is selected as the working power source (e.g., step S1080) based on the states of the secondary battery and fuel cell, even though the motor was previously selected based on the driving state of the vehicle (e.g., step S1020). This is not taught in the prior art.

Claim 38 recites a further feature of the invention whereby the control unit controls a second motor which drives auxiliary machinery when the engine is stopped. This is exemplified by the second motor 80 and the control sequence in Fig. 40. Claim 38 was rejected under 35 U.S.C. §103 as being obvious over the above references in view of U.S. patent 5,722,502 (Kubo) which was cited for the disclosure of the second motor 30. However, it is noted that the second motor 30 in Kubo is a starter motor for the engine and so cannot provide a teaching for modifying Naito to include a second motor which drives auxiliary machinery when the engine is stopped.

Applicant therefore believes that the present application is in a condition for allowance and respectfully solicits an early notice of allowability.

Respectfully submitted,

OBLON, SPIVAK, McCLELLAND,
MAIER & NEUSTADT, P.C.
Norman F. Oblon



Robert T. Pous
Registration No. 29,099

Customer Number
22850

Tel: (703) 413-3000
Fax: (703) 413 -2220
(OSMMN 06/04)
RTP/rac
I:\ATTY\RTP\243717US-AM.DOC